

## A Pushnet for Quantitative Sampling of Shrimp in Shallow Estuaries

The shallow estuaries and bayous of the Gulf Coast are used extensively as nursery grounds by several species of commercially important shrimp. In our studies on the estuarine phase of the life cycles of *Penaeus setiferus* and *Penaeus aztecus*, sampling for post-larval and juvenile shrimp in the nursery areas presents a problem. The young shrimp tend to concentrate in areas of stiff salt-cord grass (*Spartina alterniflora*) where it is difficult to operate a beach seine efficiently.

Strawn (1954) describes a one-man pushnet used in shallow water grass flats by Florida bait shrimp fishermen and demonstrates its superiority over a seine for collecting in rooted vegetation. However, the Florida-type net apparently operates most efficiently in submergent vegetation such as turtle grass (*Thalassia testudinum*), which is less rigid than the salt-cord grass. Moreover, it was considered possible that repeated sampling with this net could excessively alter or disturb the stations of limited size occurring in our study area. Finally, we felt that a satisfactory index of abundance, based on a standardized unit of effort, could not be obtained using the Florida net.

Since it appeared that no existing gear was satisfactory for our sampling program, a new type pushnet was developed. This net was designed to yield quantitative samples while being operated by one man in stiff, rooted vegetation in depths of from 3 to 18 inches.

The pushnet described here consists of three units: the handle, the yoke and runners, and the net frame. Figure 1 shows the complete assembly with the major dimensions. The handle is made of 1½ inch aluminum tubing with a wooden crosspiece at the upper end. The yoke (Fig. 1) is a U-shaped pipe, with a short extension welded to the center to receive the handle. The angle of the yoke to the runner is fixed at 30° by a pipe welded in place between the back of the runner and the yoke (Fig.

2). The tubing used for construction of the yoke in this model consists of electrical conduit, though other material such as ¾ inch aluminum tubing would be stronger and lighter. At a point immediately in front of each arm of the yoke, a 4 x 4 inch T-plate, for attaching the net frame, is welded to the runner (Fig. 2). The runners are made of 12 or 16 gauge angle iron 1½ inches wide. The toes of the runners are four inches long and are bent upwards at approximately a 50° angle. A ½ inch galvanized pipe is welded across the bases of the runner toes, approximately one inch above the bottom, to act as a bumper for the net frame. The net frame is made of ¾ x ¾ inch white pine, and the net is attached by thin strips of wood tacked to the inside of the frame. The total weight of the pushnet is approximately 12 pounds and is thus easily operated by one person.

In assembling the pushnet, the male connection of the yoke is inserted into the handle and secured in place by two bolts (Fig. 1). The net frame is attached to the runners by two pairs of bolts through the free portion of the T-plates welded to the runners. All bolts are fitted with wing-nuts to facilitate dismantling or changing nets.

In actual use, the pushnet is pushed at a standard pace for a prescribed measured distance at each station. The weight and relatively narrow width of the pushnet tend to keep it on the bottom. The bumper bar, while protecting the net frame, also serves to dislodge many organisms from the vegetation. The net frame, fixed to and stabilized by the runners, fishes at a constant angle. The method of collecting is thus standardized, and it is our opinion that samples obtained in this manner are quantitative.

Samples collected over a period of five months, using No. 20 woven nylon mesh, contained considerable numbers of invertebrates and fishes. However, from our observations, repeated sampling at weekly intervals did not appreciably alter the stations.

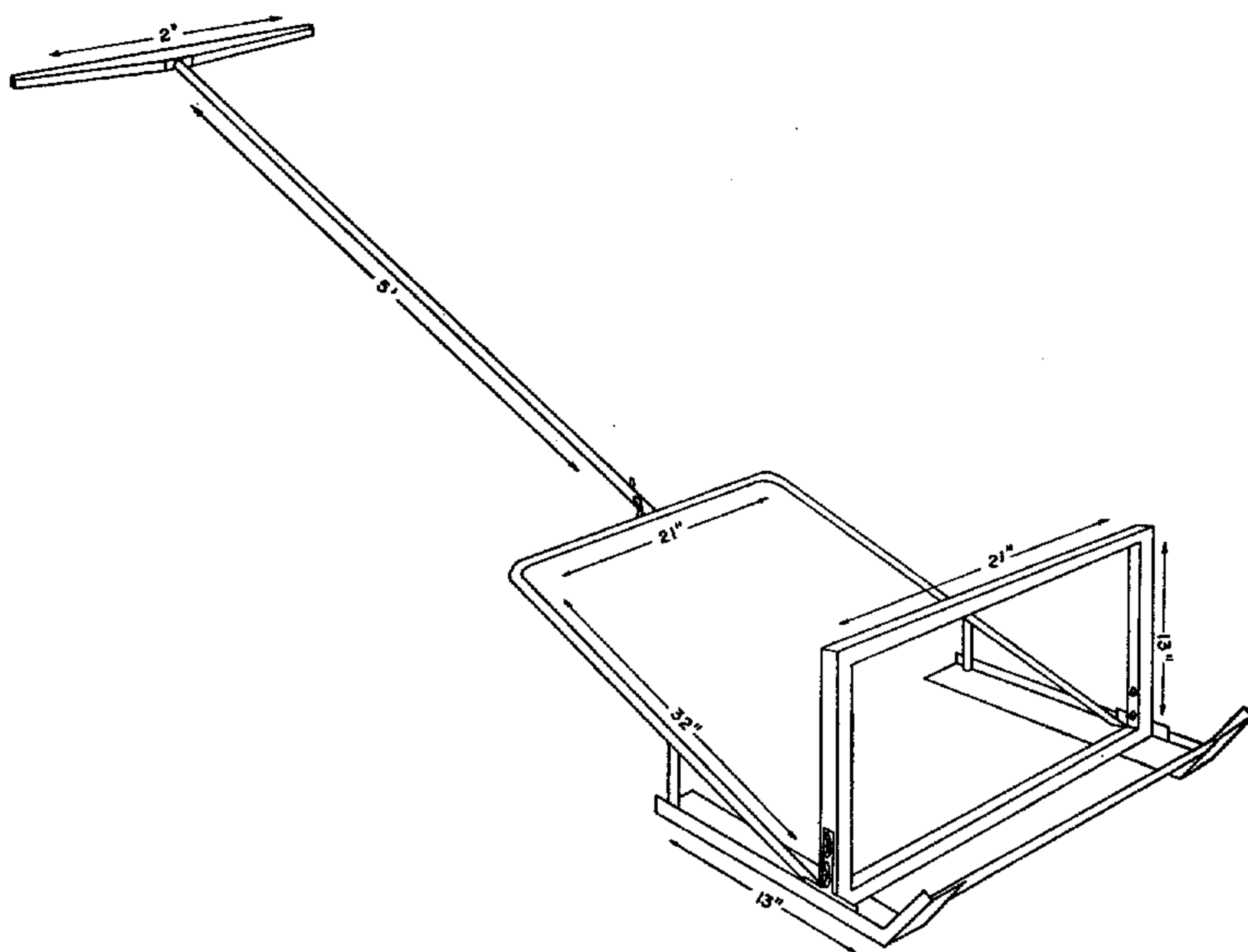


FIG. 1. Pushnet dimensions.

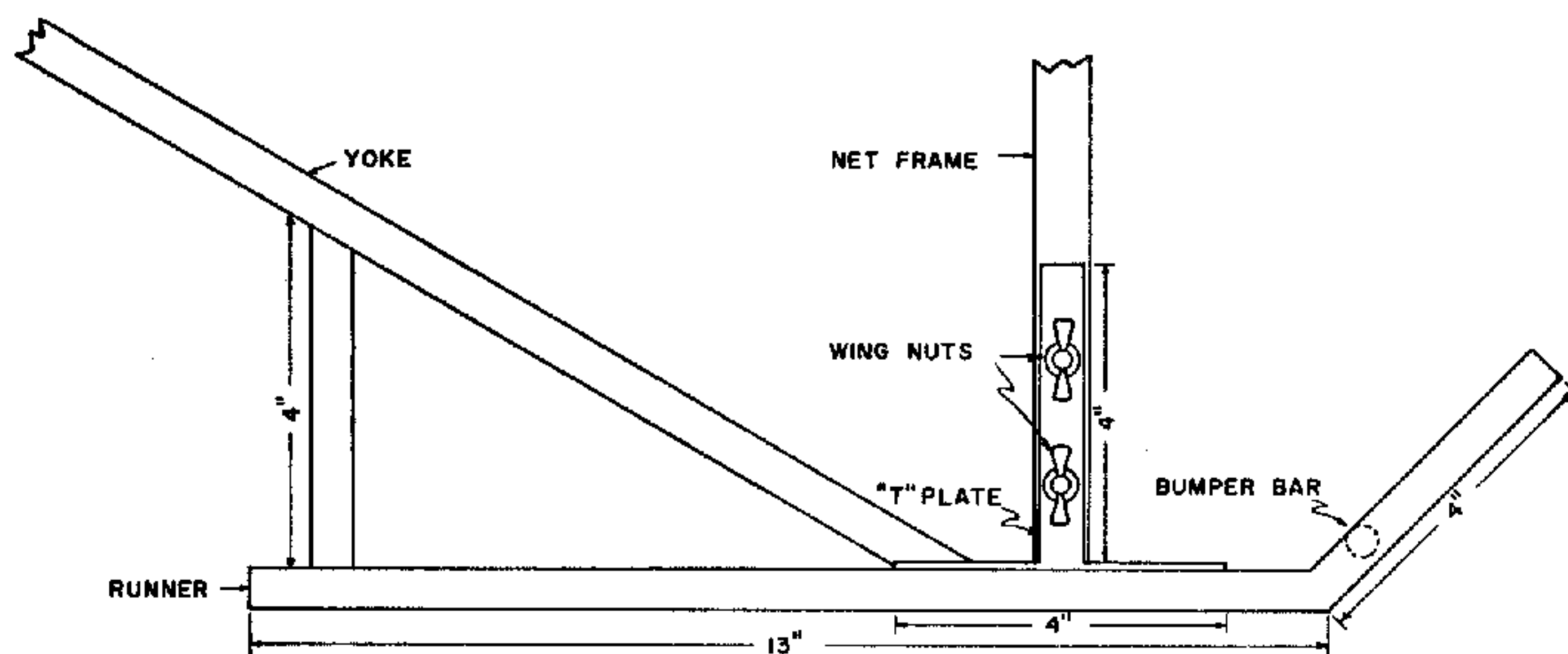


FIG. 2. Side view of pushnet showing construction detail.

We caught penaeid shrimp ranging in length from 6 to 85 mm in beds of partially inundated salt-cord grass as well as in shallow water devoid of vegetation. Shrimp larger than 85 mm probably did not commonly occur in these shallow water stations, since they were never seen leaping to avoid the net, as were the smaller shrimp.

It is considered possible, however, that the pushnet cannot capture the larger shrimp of the 6 to 85 mm size range in proportion

to their actual abundance. Furthermore, *Penaeus setiferus* may be more adept than *Penaeus aztecus* in avoiding this net. De Sylva (1954) mentions this same possibility with reference to the Florida pushnet.

Attempts were made to determine the selectivity of the pushnet with reference to the size and species of shrimp. Both the pushnet and a 20-foot seine were operated within a shallow grassy area. The results, however, were inconclusive, since

the inefficient functioning of the seine made comparison of the catch between the two types of gear impossible.

## REFERENCES

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STRAWN, KIRK. 1954. The pushnet, a one-man net for collecting in attached vegetation. *Copeia*, 1954(3): 195-197.

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